

Master of Clinical Audiology

SPEECH, LANGUAGE & COMMUNICATION 513

FIRST SEMESTER EXAM

JUNE 2001

Time Allowed 3 hours

Instructions to candidates

This exam comprises 3 parts. There are 10 pages including this front page.

Part A is worth 50 marks and contains 16 short answer questions. Answer all questions.

Part B is worth 30 marks and contains 2 case studies. Answer questions relating to both case studies.

Part C is worth 20 marks and contains a choice of two (2) essay questions. You are required to answer one (1) of the essay questions.

Write your answers in the blank booklet/s provided.

**Section A – Short Answer section. Answer in the spaces provided.
Answer ALL questions. Marks are given for each question.**

(a) The 'lip filter' has a great influence on the formant F3. Give an example of two phonemes that differ **ONLY** in their lip filtering, and therefore in F3, and explain how the lip position relates to the frequency of F3.

(b) Define and give one phoneme example for each of the following terms: bilabial, labio-dental, alveolar, glottal, and velar.

(c) What is meant by the term affricate, and give one example of an affricate. How would it appear on a sonogram?

(d) How can F1 and F2 move in different directions when changing between phonemes?

(e) What is meant by "front-back" in distinguishing phonemes?

(f) What is meant by "high-low" in terms of distinguishing phonemes?

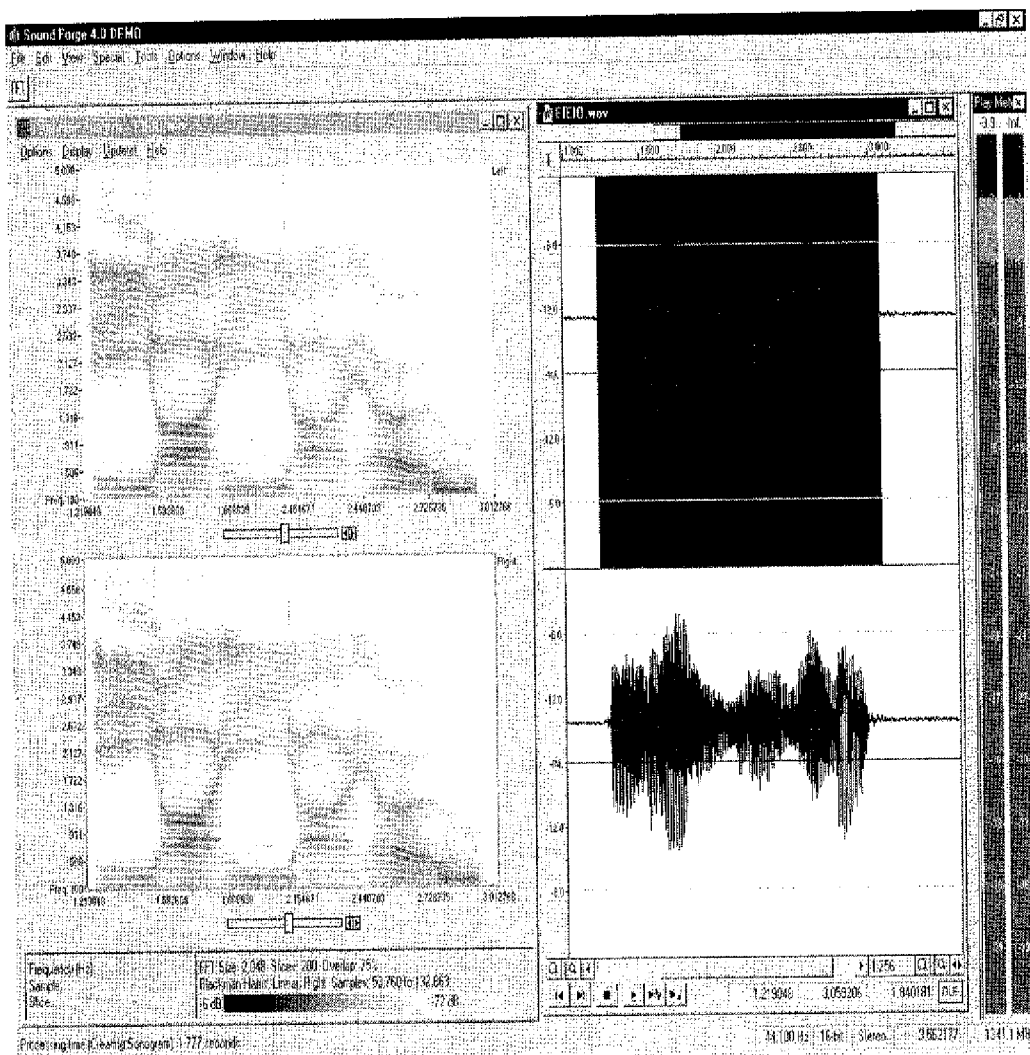
The sample sonogram below shows the phrase EIEIO, as in "Old MacDonald had a farm.....EIEIO". There are two time waveforms on the right and two spectrograms on the left because the recording was in stereo. Answer the following questions.

(g) Label the F1, F2 and F3 formants in the diagram for the first 'E' and the first 'I'. Comment on the changes in F1 and F2 frequencies, and explain the cause of the changes in their frequencies.

(h) The 'I' sound of "EIEIO" is a diphthong. How does this show itself in the sonogram? Label the main features that make the 'I' a diphthong, and explain changes in the oral cavity that produce the effect.

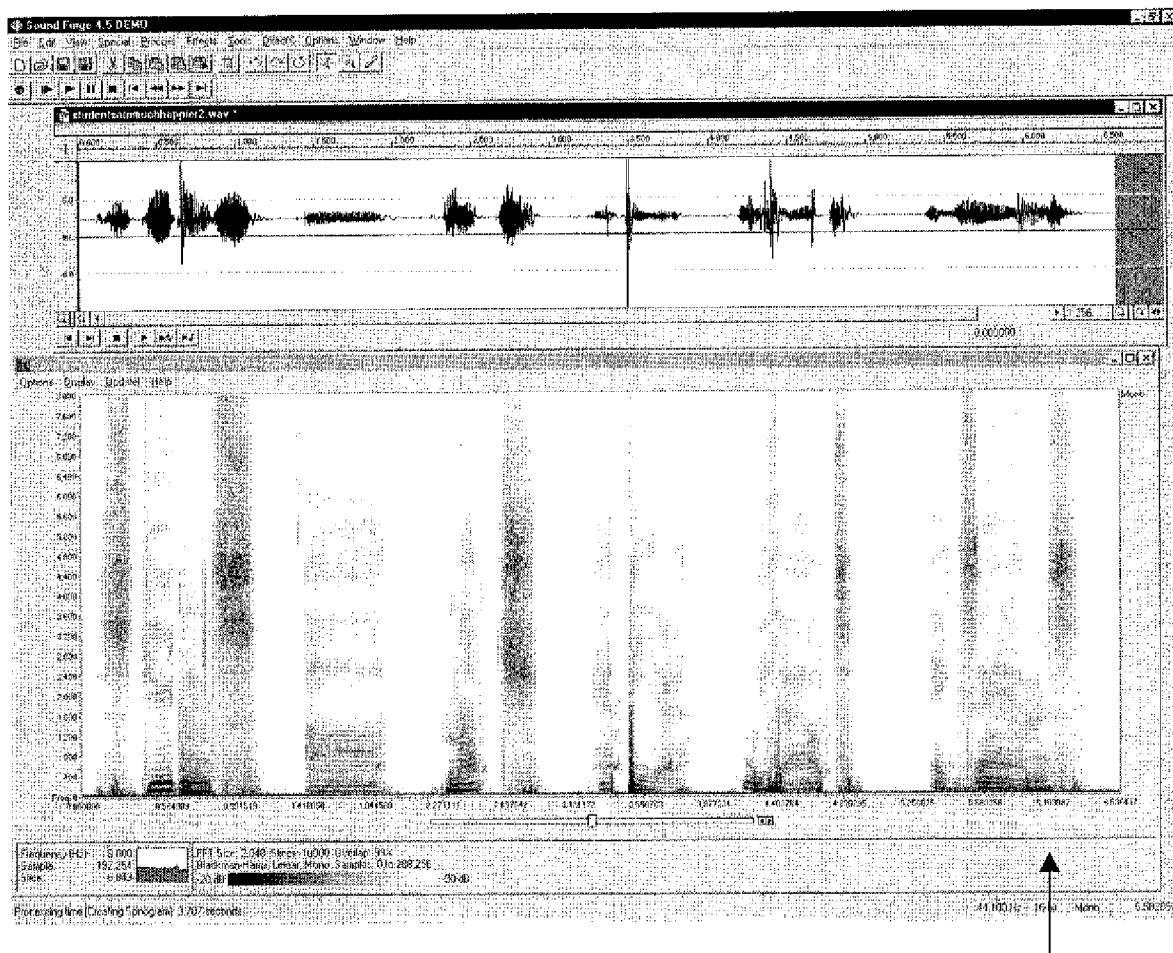
(i) The final phoneme "O" is also a diphthong. Why? Which formant is changing most dramatically for 'O' and what is the acoustic explanation for the origin of the main change in this formant? Label this feature.

Figure 1. Time waveforms and spectrogram of the phrase "EIEIO" as in Old McDonald Had a Farm.



The following time waveform (top) and its associated spectrogram (bottom) were produced by an adult male vocalising the phrase: "*Students are much happier without exams*". Answer the questions below.

- (a) What is the horizontal and evenly spaced 'striping' at point A in the lower spectrogram?
- (b) Label clearly the start and end of the first word "students". Explain the features on the sonogram that allowed you to identify the word.
- (c) In the word "much", what is happening at point B? What is the name given to such features?
- (d) What is happening around point C? Label F1 and F2 on the spectrogram, and explain why they are moving in frequency.
- (e) What is the feature at point D?
- (f) What causes the vertical white stripe at point E? What is the term for the phoneme, and how is it produced?



(h) From the International Phonetic Alphabet given in Table I, annotate the phrase:

“What moron would commit the phonetic alphabet to memory?”

(k) What are the necessary elements of a sentence?

(1 mark)

(l) Give four examples of nonlinguistic cues?

(2 marks)

(m) Give four examples of paralinguistic cues?

(2 marks)

(n) Briefly describe the behavioural theory of language acquisition. (5 marks)

(o) Before learning speech children must gain control over certain vocal and articulatory parameters. What are they? (3 marks)

(p) What are the first consonants you would expect a child to produce? (2 marks)

(q) What is the Critical Age Hypothesis in speech development? (3 marks)

(r) Explain the concept of brain plasticity. (2 marks)

(s) Briefly explain receptive language processing. (5 marks)

(t) Briefly explain expressive language processing. (5 marks)

(u) What are phonological processes? (1 mark)

(v) Give four examples of phonological processes. (2 marks)

(w) What is Developmental Verbal Dyspraxia and what are some of its characteristics? (3marks)

(x) What are the characteristics of Broca's aphasia? (3 marks)

(y) What are the characteristics of Wernicke's aphasia? (3 marks)

(z) What are the factors that influence the development of language in the presence of hearing loss? (3 marks)

(aa) What were the findings of Yoshinaga-Itano, Sedey, Coulter & Mehl research in 1998 in regards to language skills in children with hearing loss? (5 marks)

(bb) What is the difference between augmentative and alternative communication?
(1 mark)

(cc) What is sign supported communication? (1 mark)

(dd) Explain Auslan in some detail. (3 marks)

Part B - Essay questions. Answer each question in a SEPARATE answer book. Essay questions are of EQUAL value, and each should take about 30 minutes.

1. Answer two (2) of the following four (4) questions.

(a) Figure 1 shows the spectrogram of the phrase *“Well, I simply hate exams! The stress is too much to bare”*. Identify each word and phoneme in the spectrogram, and annotate diphthongs, sibilants, affricates, liquid

OR

(b) Explain the main formants of speech and how they are created, how they appear in a spectrogram, and what determines their frequency. Also explain their relationship to the harmonics of the vocal chord vibration. Explain also how the formants and harmonics of the vocal chord vibration appear on the spectrogram, and how voiced and unvoiced (whispered) phonemes appear?

OR

(c) When recording a voice to computer for later spectrogram analysis, some students fail to correctly set the sampling rate and number of bits for sampling (8 bits versus 16 bits). They also forget to speak loudly enough into the microphone. Define and explain the significance of the terms “sampling rate”, “8 bit or 16 bit sampling” and “signal-to-noise ratio” in obtaining a spectrogram. In this context, what is meant by the terms “aliasing” or “undersampling”?

OR

(d) Explain the link between the standard spectrum display obtained from a digital spectrum analyser (DSA) and the chart or spectrogram/sonogram produced a spectrograph.

2. Compulsory essay question: Describe the stages of language acquisition.

3. Answer only one (1) of the following two (2) essay questions.

(a) There are several “critical variables” which influence the psychology of hearing impairment. What are they and briefly describe how they affect an individual?

OR

(b) Language is a very complex system, which can be best understood by breaking it down into its functional components. There are three components, form, content and use. Explain these terms and what is included in each component.

Table I: The International Phonetic Alphabet

/i:/	<i>seat</i>	/t/	<i>tin</i>
/ɪ/	<i>sit</i>	/d/	<i>din</i>
/e/	<i>set</i>	/k/	<i>cap</i>
/æ/	<i>sat</i>	/g/	<i>gap</i>
/ʌ/	<i>cut</i>	/tʃ/	<i>chop</i>
/ɑ:/	<i>cart</i>	/dʒ/	<i>job</i>
/ɒ/	<i>cot</i>	/f/	<i>fat</i>
/ɔ:/	<i>caught</i>	/v/	<i>vat</i>
/ʊ/	<i>put</i>	/θ/	<i>think</i>
/u:/	<i>shoe</i>	/ð/	<i>this</i>
/ɜ:/	<i>bird</i>	/s/	<i>sin</i>
/ə/	<i>swimmer</i>	/z/	<i>zoo</i>
/eɪ/	<i>say</i>	/ʃ/	<i>shoe</i>
/aɪ/	<i>sigh</i>	/ʒ/	<i>vision</i>
/ɔɪ/	<i>boy</i>	/h/	<i>hat</i>
/əʊ/	<i>know</i>	/m/	<i>mat</i>
/aʊ/	<i>how</i>	/n/	<i>not</i>
/ɪə/	<i>here</i>	/ŋ/	<i>sing</i>
/ɛə/	<i>fair</i>	/l/	<i>live</i>
/ʊə/	<i>sure</i>	/r/	<i>road</i>
/p/	<i>pig</i>	/w/	<i>wet</i>
/b/	<i>big</i>	/j/	<i>yes</i>